AARDO International Workshop (2003)
Agricultural Technology Transfer and Its Consequences
1-22

Technology Transfer for Rural Development: Personal and Social Communication Perspectives[1]

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ABSTRACT

Technology transfer doesn't happen in a vacuum. Internal and external factors influence technology transfer before development can happen. This paper discusses the factors that affect technology transfer from the point of view of the individual and society. Concepts related to technology transfer are discussed, among these are: development, social change, participation, communication and some technology transfer mechanisms.

This paper discusses technology transfer based on two communication theories: Reciprocal Determinism Theory (Bandura 1996) and Communication for Social Change Model (Figueroa and Kincaid 2002).

Bandura's Reciprocal Determinism Theory maintains that human development reflects interaction among an active person and the person's behavior, and the environment. The links among these three are interactional, i.e., they flow in both directions. This theory was tested and was proven applicable in a participatory development project (Javier 1997).

The Communication for Social Change Model describes how social change (development) can happen through a process of community dialogue leading to a collective action that affects the welfare of communities as a whole, as well as, individual member. The theory is descriptive, as well as, prescriptive.

The technology transfer mechanisms discussed are Technology Assessment, Farmers' Information and Technology Services, Farmer-Scientist Bureau, Regional Applied Communication Office, and Information and Communications Technology.

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1 Paper presented during the "International Workshop on Agricultural Technology Transfer and its Consequences" held from 25-30 August 2003, Agricultural Research Institute, Wufeng, Taichung, Taiwan.

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Introduction

Technology transfer doesn't happen in a vacuum. Internal and external factors influence technology transfer before development can happen. This paper discusses the factors that affect technology transfer from the point of view of the individual and society. Concepts related to technology transfer will be elucidated. Among these are the concepts of development, social change, participation, communication, and some technology transfer mechanisms.

This paper discusses technology transfer based on the Reciprocal Determinism Theory (Bandura 1996) and the Communication for Social Change Model (Figueroa and Kincaid 2002).

The premise of this paper is that technology transfer leads to rural development. Development is a process of social change. It involves improvement in factors, which affect the standard of living and quality of life of the people. Development affects three major areas of change: environmental (access and use of natural resources, education, health, and social status), economic (production or income, technological, access to the factors of production, etc.), and political (power, control, access, leadership, equity, and distribution of benefits) (Natpracha and Stephens 1991).

Bandura's Reciprocal Determinism theory maintains that human development reflects interaction among an active person and the person's behavior, and the environment. The links among these three are interactional i.e., they flow in both directions. Therefore, we both are shaped by our environment and shape it. (Shaffer 1996).

Social change is an ongoing process that can be spontaneous or purposeful. The Communication for Social Change Model describes how social change can happen through a process of community dialogue leading to a collective action that affects the welfare of communities as a whole, as well as, individual members.

Participation is a process by which people become involved at all stages in their development, studying their own situation and making decisions in: research, planning, implementing and managing, monitoring and evaluating, and deciding on the distribution of benefits to ensure equitable sharing (Natpracha and Stephens 1991).

The importance of communication in development saw its beginnings in the work of Paulo Freire (1970) who conceived of communication as dialogue and participation for the purpose of creating cultural identity, trust, commitment, ownership, and empowerment (Figueroa 2002). There is a widespread awareness in the field of development communication that community participation is a valuable end in itself as well as a means to a better life.

What is Technology Transfer?

The dictionary defined technology as the application of scientific knowledge for practical purposes (Jewell and Abate 2001). Caoyonan (1994) defined it as the application of scientific or theoretical know how for practical purposes. It is the means by which man improves his life through the centuries.

The dictionary defined technology transfer as the transfer of new technology from the originator to a secondary user, especially from developed to less developed countries in an attempt to boost their economies (Jewell and Abate 2001). Caoyonan (1994) defined it as the dynamic transfer of technology, which involves the development of skills, knowledge, and experience of the recipient so he can acquire an autonomous capacity to implement technical changes and/or build new facilities.

Classification of Technologies (PCARRD 2001)

Technologies may be classified as follows:

- Product – This type of technology takes the form of physical goods. Examples are farm equipment and machinery, new crop varieties and hybrids, feed formulations, etc. These technologies are normally directed toward a specific market demand.
- Process – Technologies of this nature are not tangible and may refer to systems for doing things or systems for improved production and postproduction. These may also involve models or strategies for efficient utilization, conservation, and management of resources; marketing and distribution system; seed production system, and others. In general, they are aimed at increasing productivity and efficiency but cannot by themselves create a market for their use. Examples are biological method of coconut oil extraction, farming systems for small hold upland farmers and village-level coconut processing.
- Service – This type of technology generally provides the complementary activities or services to enhance existing government programs and policies. Technologies under this category may necessitate government support especially in the early stages where market structure may not yet provide adequate premium to encourage payoff to private investments. For instance, estrus synchronization and artificial insemination to improve Philippine buffalo.
- Information – Other technologies are simply information or research findings that may indicate valuable socioeconomic and technical databases for policy formulation and follow-up R&D activities. These may also refer to computer aided information systems in support of agricultural production.

Methods of Technology Transfer (Viloria 1977)

Technology may be transferred as follows:

- Direct investment in a subsidiary, joint venture or other type of enterprise.
- Direct purchase of operative technology like the purchase of equipment or the employment of a consultant.
- Management contracts of varying scope and duration and covering pre-investment and post-investment services and the management of enterprises.
- License agreements concerning know-how, patents, trademarks, and designs, etc.
- Turn-key contracts.
- Efficient dissemination and utilization of published technological information.
- Training of personnel at research and development institutes/laboratories in developed countries.

Unsuccessful technology transfer (Viloria 1977)

Technology transfer may not be successful due to the following:

- Technology is too advanced or not adapted to the country.
- Differences in the labor Vs. capital factors found in the developing and developed economies are not given consideration.
- Inadequate infrastructure, insufficient trained manpower, inadequate markets, or other social, cultural or economic barriers to high technology transfer.
- Technology is not in keeping with national development goals.

Criteria in selecting appropriate technology (Viloria 1977)

Appropriate technology is that level of technology, which is best suited to the specific cultural, economic, social, environmental, and political climate found in the various countries of the world. The following are the criteria in selecting appropriate technology:

- Technology is seldom directly transferable. More often than not it must be adapted to different environmental conditions. For example, dry-land rice harvesting machinery will not work in a wetland rice growing country.
- The various cultural, political, economic and infrastructure conditions must be considered in suggesting the appropriate technology. For example, a high electric power-using technology would be inappropriate for an area devoid of reliable electric power.
- To the maximum extent possible local materials and natural manpower and man-made resources should be utilized.
- Appropriate technology should encourage and foster indigenous initiative and innovation. It is not sufficient to buy technology and know-how and transfer and install

it without encouraging in the productive system flexibility and a willingness to change with changing markets and other factors.

- Appropriate technologies must have or develop logistical support systems, such as maintenance services and spare parts availability.

Characteristics of technology (Reyes 1993)

Certain attributes of a technology facilitate its adoption:

- Relative comparative advantage (over an existing technology) in terms of lower cost, lower risk, higher economic returns, and technical superiority.
- Compatibility with an existing norm or practice.
- Ease or simplicity of application or use with less mental or physical effort from the adopters.
- Replicability or ease of replicating the technology in the client's situation.
- Observability or demonstrability in terms of outputs of results being readily observable with not much waiting time.
- Reliability in terms of promised outputs or results being achieved or observed as specified.
- Environment-friendly.

Theoretical Framework

Technology transfer happens in a social context. Individuals make technology transfer possible. The theory on Reciprocal Determinism analyzes technology transfer from a personal point of view. Society is made up of individuals, which make technology transfer possible. The theory on Social Communication for Social Change analyzes technology transfer from a societal point of view. The theories are descriptive but are also prescriptive. The theories describe and prescribe mechanisms on how to effectively transfer technology.

Personal Communication Model

Aggression on television is related to violence (APA 2003)

Aggression is related to watching television. Specifically, children who watch violence on television grow up to be aggressive adults. As early as 1963, Bandura suggested that children's imitation of aggressive acts seen in films suggests that we might learn aggression by watching violence on television.

- Berkowitz (1974) studied a group of boys when they were 9 years old. Ten years later he found out that those boys who watched the most violence on television were the most aggressive when they were 19.
- Philips (1983) reported that the number of homicides in the United States significantly increased after championship boxing matches was aired on television.
- Huesmann and Eron (1986) studied 758 subjects. The researchers found positive correlations between overall television violence viewing and aggression in all grades in the United States.
- Eron and his associates at the University of Illinois confirmed that children who watched many hours of television violence when they were in elementary school tended to also show a higher level of aggressive behavior when they became teenagers. By observing these youngsters until they were 30 years old, Eron found that the ones who watched a lot of television when they were 8 years old were more likely to be arrested and prosecuted for criminal acts as adults.
- In 1982, the National Institute of Mental Health in the US confirmed that violent programs on television lead to aggressive behavior by children and teenagers who watch those programs.

Communication is related to Participation in Development

The negative effects of media cannot be underestimated. While the negative effects of media have been studied extensively, very few studies have been conducted to prove the positive effects of media. The author (Javier 1997) conducted a study to determine the relationships of communication, participation, and personal social cognition. The author wanted to prove that rural development might be achieved given internal and external stimuli. The author proved that positive communication could lead to positive action.

Reciprocal Determinism Theory

Human functioning is a result of the continuous reciprocal interaction of behavioral, personal, and environmental influences, called reciprocal determinism. Human behavior is a triadic, dynamic, and a reciprocal interaction of personal factors, behavior, and the environment (Bandura 1977, 1986, 1989 in Figueroa et al 2002).

Bandura's triadic model of reciprocal determinism indicates that while behavior is influenced by the environment, the environment is also partly a product of a person's own making, so that people can exercise some influence over their own behavior. Bandura also argues that because of their extraordinary capacity to use symbols, human beings are able to think, create and plan cognitive processes that are constantly revealed through overt actions.

Each of the three variables in the reciprocal determinism model is capable of influencing each of the other variables (Hjelle1992).

According to this theory, an individual's behavior is uniquely determined by each of there three factors. Emphasizing on cognition, this suggests that the mind is an active force that constructs one's reality, selectively encodes information, performs behavior on the basis of values and expectations, and imposes structure on its own actions (Jones, 1989). Through feedback and reciprocity, a person's own reality is formed by the interaction of the environment and one's cognitions. It is through an understanding of the processes involved in one's construction of reality that enables human behavior to be understood, predicted, and changed.

On the question, "Which of the three parts of the model will influence which other part?" this mainly depends on the strength of each of the variables (Hjelle1992). Hjelle adds that social cognitive theory subscribes to a model of reciprocal causation in which cognitive, affective, and other personal factors, and environmental events all operate as interacting determinants.

The person-behavior interaction involves the bi-directional influences of one's thoughts, emotions, and biological properties and one's actions (Bandura, 1977, 1986, 1989 in Figueroa et al 2002). For example, a person's expectations, beliefs, self-perceptions, goals, and intentions give shape and direction to behavior. However, the behavior that is carried out will then affect one's thoughts and emotions. Biological factors are also accounted for, such as sex, ethnicity, temperament, and genetic predisposition and the influences they have on behavior.

A bi-directional interaction also occurs between the environment and personal characteristics. In this process, human expectations, beliefs, and cognitive competencies are developed and modified by social influences and physical structures within the environment. These social influences can convey information and activate emotional reactions through such factors as modeling, instruction, and social persuasion. In addition, humans evoke different reactions from their social environment as a result of their physical characteristics, such as age, size, race, sex, physical attractiveness.

The final interaction occurs between behavior and the environment. Bandura contends that people are both products and producers of their environment. A person's behavior will determine the aspects of their environment to which they are exposed, and behavior is, in turn, modified by that environment. A person's behavior can affect the way in which they experience the environment through selective attention. Based on learned human preferences and competencies, humans select whom they interact with and the activities they participate in from a vast range of possibilities. Human behavior also influences their environment, such as when an aggressive person creates a hostile environment. Thus, behavior determines which of the many potential environmental influences come into play and

what forms they will take. In turn, the environment partly determines which forms of ones behavior are developed and activated.

Bandura suggests that it is symbols that serve as the mechanism for thought. Through the formation of symbols, such as images (mental pictures) or words, humans are able to give meaning, form, and contiguity to their experiences. In addition, the capability to form symbols enables humans to store information in their memory that can be used to guide future behaviors. It is through this process that humans are able to model observed behavior.

Symbols provide the mechanism that allows for cognitive problem solving and engaging in foresightful action. It is through foresight that one can think through the consequences of a behavior without actually performing the behavior. Research indicates that indeed much of human thought is linguistically based, and that there is a correlation between cognitive development and language acquisition.

Conceptual Framework

A study was conducted by this author on Personal Social Cognition, Communication, and Participation in an Agricultural Resources Management Program (1997). The study tried to prove that human functioning might be determined by the interaction of three variables, personal social cognition, communication, and participation (Figure 2). This was based on Bandura's reciprocal determinism model as shown in Figure 1. Following Bandura's model, personal social cognition was considered as a personal factor; communication was considered as an external factor due to outside stimuli (other individuals, and mediated strategies); and participation was considered as an overt behavior.

Specifically, this research assessed the effects of personal social cognition and how it is affected by communication and participation in a participatory R&D project. Personal social cognition referred to the structure or schema (people, event, role, self schema) and attribution (internal or external; controllable or uncontrollable; and stable or unstable) of individuals.

Participation referred to the individual's planning, decision-making, implementation, research designing, monitoring and evaluation, policy-making, etc., activities of the FARM Sub-Programme on Asian Biotechnology and Biodiversity (ABB). Participation was predicted to affect and be affected by personal social cognition, and communication.

Communication, on the other hand, referred to the individual, group, and mediated communication strategies. This study assessed the effects of communication in participation and personal social cognition.

are advised to apply the participatory approach (from planning, decision-making, implementation, policy-making, monitoring and evaluation, research design, etc.) in order to achieve a high level of participation from members.

These findings indicate that the FARM Programme needs to strengthen the capabilities of farmer-participants to understand themselves, the other participants, and their environment so that participants may be able to predict and control the Programme's directions. The communication component must also be strengthened as it affects the participatory behavior of the respondents. All in all, sustainability of the FARM Proramme may be achieved if the three components (personal social cognition, communication, and, participation) will be strengthened and sustained.

Social Communication Model

Communication for social change model

The model of Communication for Social Change (CFSC) (Figueroa 2002) describes a process where "community dialogue" and "collective action" work together to produce social change in a community that improves the welfare of members. The model describes a dynamic, iterative process that starts with a catalyst/stimulus that can be external or internal to the community. This catalyst leads to dialogue within the community that when effective, leads to collective action and the resolution of a common problem.

The catalyst represents the trigger that initiates the community dialogue about a specific issue of concern or interest to the community. This catalyst is a missing piece in most of the literature about development communication. Some type of catalyst is necessary to stimulate a community to consider and discuss a problem.

Six potential catalysts:

1. Internal stimulus – problem in the community.
2. Change agent – induces the community to take some type of collective action.
3. Innovation – availability of new invention, may stimulate a community to talk about its adoption.
4. Policies – prompt the community to act.
5. Technology – may stimulate the community to talk.
6. Mass media – include messages designed to promote individual behavior or collective action, may stimulate members of the community to adopt the behavior or to emulate other communities that have achieved some common goal by working together.

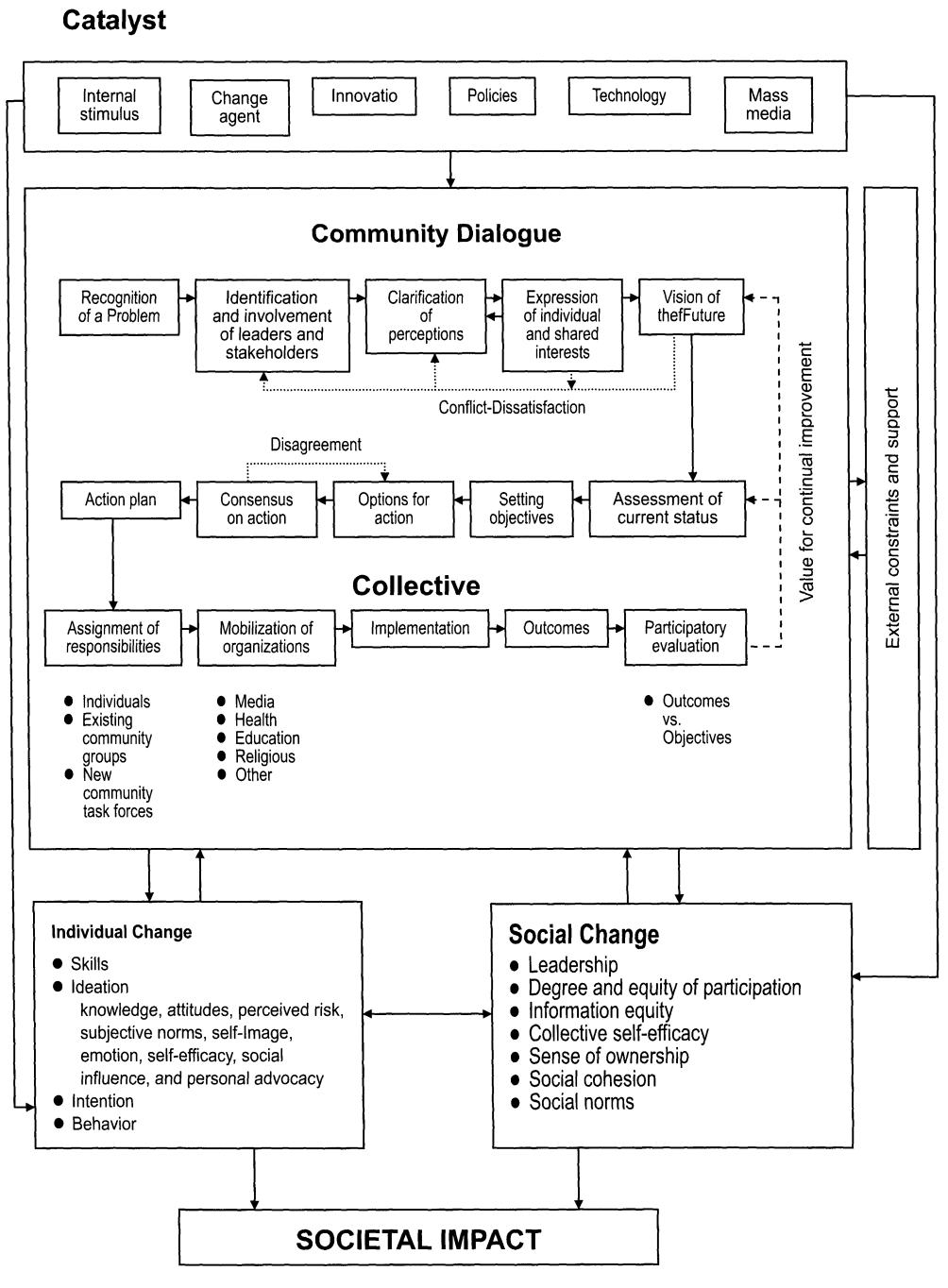

Figure 3. Integrated model of communication for social change (Figueroa and Kincaid 2002).

Community dialogue and action describes a sequential process or series of steps that can take place within the community, some of them simultaneously, and which lead to a solution to a common problem. Previous experience and literature indicate that if these steps are successfully completed, community action is more likely to be successful.

The 10 steps of community dialogue are:

1. Recognition of a problem – As a result of a catalyst, someone in the community becomes aware of the existence of a problem.

2. Identification and involvement of leaders and stakeholders – Someone exercises leadership and takes responsibility for solving the problem. The leader identifies other opinion leaders and resource persons who can help in the process for solving the problem.

3. Clarification of perceptions – It is possible that different perceptions of the problem exist among different members of the community. Unless a consensus can be reached regarding the nature of the problem and its causes, it will be difficult for the group to find an adequate course of action that is acceptable to everyone. Dialogue is necessary to create a mutual understanding (common framework) with which to solve the problem. Only after such perceptions have been clarified and different points of view rectified can the process move forward with a clear understanding of how the problem should be addressed.

4. Expression of individual and shared needs – Involve individuals that are among the most disadvantaged. Not everyone will experience the problem with the same severity. It is important that all affected in the community get the chance to express their own views and needs. If any conflict or dissatisfaction arises, then community leaders have to resolve the conflict before much progress can be made with the problem.

5. Vision of the future – The 'ideal' picture of how the community wants to see itself in the future. This will be the answer to the question: "Where do we want to be in a year from now, with respect to the problem?" It is important that this vision involves representatives of all affected groups (stakeholders) in the community so that it becomes inclusive of all interests. The common vision expresses all of the changes that will occur and the benefits that everyone expects to receive.

6. Assessment of current status – Assessment of status tells them where they are now. Quantification of the problem will give a clear idea of the size of the problem. Qualitative assessment would consider what kind of problem is occurring and how it

differs from previous experiences. Unless a clear measure of the problem is established it will be difficult to set goals for action, and determine if any progress is being made.

7. Setting objectives – The act of comparing one's current status with one's desired status and then setting realistic goals is the source of group motivation. Moderate goal setting that is achievable creates the high level of group motivation that is required for people to take sufficient action to solve a problem.

8. Options for action – Implies the identification of resources both inside and outside the community as well as persons or groups that can carry them out. A sufficient consensus for action must be reached to avoid conflict.

9. Consensus on action – Once a detailed plan is at hand, a new process of getting consensus among the community needs to take place. Getting consensus is important not only for summing up resources but also for getting people to volunteer for assigning courses of action to various members of the community. The more the community participates and sees the proposed actions as 'theirs', the more likely that they will take action. Likewise, the more a community is 'involved and committed' the higher the empowerment and sense of collective self-efficacy that the community will develop.

10. Action plan – A specific timetable for when each activity has to be accomplished will help the community to have clear deadlines for effectively moving toward the solution of the problem. The question to be answered is: "Who does what and when do we need to do each activity and organize ourselves to accomplish our goals?"

Collective action describes the process of effectively executing the action plan and the evaluation of its outcomes. The model identifies five key action steps:

1. Assignment of responsibilities – To convert a plan into action, specific people must take responsibility to accomplish specific tasks within a specified period of time. Someone must take responsibility for each of the activities identified in the action plan.

2. Mobilization of organizations – Obtain the support and help of pre-existing community resources. Communication through the local media can be an invaluable resource for mobilizing community support and activity. The media can facilitate the dialogue and action process as follows:

    a. It can support the diagnosis of problem situations and the presentation of the problem to the community.
    b. It can stimulate community deliberation and the prioritizing of problems.

c. It can support the exchange of ideas and experiences among distant communities.
d. It can help community organizations find solutions to problems and in the action phase, communication and local media can contribute by:
e. Informing the community about available services and how to gain access to them.
f. Training community members how to use the media to inform the general public about their needs.
g. Helping communities to obtain legitimization and support from authorities.
h. Providing feedback to the community about the progress and achievements of community projects, and
i. Praising/rewarding communities for their achievements and thereby enhancing member's self-esteem and sense of collective self-efficacy.

3. Implementation – Refers to actual execution of the action plan and its monitoring. No plan can be successful if the required work is not done. Leaders, members, and subgroups should take responsibility for monitoring all the tasks assigned making sure that activities are moving according to the timetable and everyone is fulfilling their responsibilities.

4. Outcomes – Refers to the actual results that the community is able to achieve given the resources, organization, and mobilization process specified in the action plan and then carried out.

5. Participatory Evaluation – Compare the outcomes to the shared vision and original objectives. The result of the participatory evaluation should be anew reassessment of the current status of the community with respect to the problem.

The state of the community in terms of the status of the individual who comprise it as well as the community as a whole can be measured at any time before, during and after a development project has been undertaken. The potential outcomes of dialogue and collective action for the individuals who participate include:

1. Improvement in skills necessary to perform new behaviors;
2. Ideational factors such as knowledge, beliefs, values, perceived risks, subjective norms and even self-image; emotional responses such as feelings of solidarity, empathy, and confidence; and increase in social support and influence from others as well as increased advocacy to others;
3. Intention to engage in new behavior in the future;

4. Specific behaviors related to the problem addressed by the dialogue and collective action. The model also indicates that these individual outcomes can be the result of the direct influence of one of the external catalysts identified in the model, such as mass-media messages that promote specific practices.

The model lists seven possible outcomes of social change that may occur:

1. Leadership – Development of sustained and effective leadership, which provides a base for organizing community participation, is an important outcome indicator for social change. Strong and supportive leadership is characterized by a combination of open management, shared vision, team spirit, decentralized control, and role clarity.

2. Degree and equity of participation – This dimension measures the range of participation to include the traditionally disenfranchised members of the larger community and the diversity of activities which members get involved, ranging from planning, selection of leaders, decision on services and modes of delivery, resource mobilization and management, to evaluation of program outcomes.

3. Information equity – This refers to the level of awareness about an issue that is shared (common wisdom) among different individuals within a group or between different groups in a community. Individuals with a good understanding about the issue or program and with access to sources of information will be more likely to participate, and that will reinforce other social change outcomes such as sense of ownership.

4. Collective self-efficacy – This refers to the group's shared belief in its conjoint capabilities to attain their goals and accomplish desired tasks.

5. Sense of ownership – This is defined as the community's feeling/belief that the problem/issue and/or program belong to them and they have a commitment to the program. Sense of ownership reinforces what people learn and encourages them to integrate the shared learning into related situations.

6. Social cohesion – Social cohesion consists of the forces that act on members of a group or community to remain in, and actively contribute to the group. In cohesive groups, members want to be part of the group; they generally like one another and get along well, and are loyal and united in the pursuit of group goals. Social cohesion is an important antecedent and consequence of successful collective action. Social cohesion mediates group formation, maintenance, and productivity.

7. Social norms – Social norms are the collectively agreed-upon standards and rules that are adhered to and accepted by the majority of the members of a particular society or group. Social norms are people's beliefs about the attitudes and behaviors that are normal, acceptable or even expected in a particular social context.

Technology Transfer Mechanisms

Different technology transfer mechanisms have been devised to ensure rural development. The following are some of the technology transfer mechanisms developed by PCARRD.

A. Technology Assessment (PCARRD 2001)

Technology assessment is a type of policy analysis that supports decision making about technology or technological projects. It is the process of anticipating and analyzing a broad range of socio-cultural, technical, economic, environmental, and political/legal aspects prior to the introduction of a given technology or even while a technology is being promoted or commercialized. It is designed to anticipate the gaps and risks associated with technology transfer and utilization. Appropriate interventions are determined to mitigate such gaps/risks.

Recent trends in technology management already include technology assessment in the design and development phase of new technology instead of doing evaluation after a specific technology has been generated. This approach is based on the idea that during the course of technology generation, choices are constantly being made about the form, the function, and the use of a technology and consequently technology generation can be directed to suit the requirements of various stakeholders concerned.

Technology Assessment Protocol

A technology assessment protocol (TAP) was developed by PCARRD to provide the step-by-step process of evaluating technologies for eventual promotion and commercialization.

Step 1 – Technology Identification/Pre-screening

a. Technology classification – Classify the technology whether it is a product, process, information or service.

b. Technology characterization – Gather, examine, and analyze all possible sources of information about a particular technology.

c. Technical feasibility – Screen and prioritize technologies which should be subjected to TAP. This screening aims to fast track the short listing of technologies for assessment, thus saving time, money, and effort in evaluating technologies which are not technically feasible in the first place. Evaluate the validity, reliability, and replicability of technologies.

Recommend for further R&D work technologies found having certain technical problems. On the other hand, proceed to the next step if the technology is found to be technically feasible.

Step 2 – Technology Scanning

This is a process to gauge the state-of-the-art of a particular technology. Scanning measures the socio-cultural, technical, economic, environmental and political (STEEP) aspects of a technology. The output of technology scanning is a recommendation for either: a) detailed assessment of technologies or b) return of technologies to R&D stage for refinements.

Step 3 – Technology Validation

a. Table evaluation – Use the following tools: Quick Resource Appraisal, a gap identification tool; and the Risk Management Process, an intervention identification tool.

b. Field evaluation – Validate the findings in the field.

Results of TAP will be recommended interventions for technology packaging, promotion, and/or commercialization or the repackaging of technologies already being commercialized.

B. Farmers' Information and Technology Service (FITS) Centers

This is an information and technology delivery service facility, which is aimed at improving access of farmers, traders, processors, entrepreneurs, and other stakeholders to information and technologies in agriculture and natural resources.

As provider of information service, FITS provides information materials in different formats such as print, audio-visual, and e-based media. A pool of experts may be tapped to render appropriate services and to package information and technology services to clients. FITS centers respond to client needs in terms of technology clinic, training, caravans, sale of planting materials, linkaging, and enterprise development.

C. Farmer-Scientist Bureau

This is composed of outstanding farmers who demonstrate successful application of S&T-based and indigenous technologies. These farmers are active participants, enablers,

facilitators, or initiators of technology development and transfer processes.

Participating outstanding farmers are identified, evaluated and selected based on a set of criteria. The farmer-scientist has the following functions:

- Acts as resource person during trainings, seminars, field days, investment clinics, cross-visits, etc.
- Provides technical assistance and hands-on training and shares experimental insights to on-farm visitors and other trainees.
- Devotes a certain portion of his/her farm as demonstration plot for his/her own on-farm trials.
- Tests/applies technological information learned from the seminars and cross-visits attended; and
- Influences other farmers in adopting his outstanding farm practices by sharing information, experiences, resources, and ideas.

D. Regional Applied Communication Office (RACO)

The RACO is an integral part of the Regional Research Consortium of the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD). It is an organization of communication specialists within the Research Consortium. The RACOs undertake Information Education and Communication (IEC) activities, a research- and need-based communication process aimed to hasten adoption of technologies by clients. IEC involves needs assessment, objective setting, communication planning, design and production of prototype, testing and dissemination of IEC materials in print, audio-visual, broadcast and other electronic formats, impact evaluation, and interpersonal approaches such as information caravan, and technology exhibits. Generally, the RACOs pursue six activities, which vary in scope depending on the need and resources available among members and cooperating agencies.

Publications/prototype production

This activity includes planning, preparation and production of publications such as annual reports, newsletters, leaflets, brochures and other printed materials on practicable technologies.

Instructional materials production

Realizing the limitation of publications, the RACOs have embarked on the production of low-cost instructional materials such as posters, slide tape presentations, primers, techno guides, and fact sheets on recommended technologies.

Scientific literature services

Through the RACOs, the scientific literature services in the regions have actuated in orchestration with PCARRD's national research information retrieval and documentation program.

Mass media linkages

Given considerable mileage the RACOs use the mass media for technology dissemination. Most RACOs use radio as a medium for technology dissemination.

Communication research

Having been involved in communication and evaluation research for years, some RACOs conduct communication research to further improve communication project planning and implementation, e.g. needs assessment, pre-testing/post-testing, impact evaluation, etc.

Communication training

To develop communication capability, the RACOs conduct trainings and workshops in communication.

E. Information and Communications Technology (ICT)

ICT facilitates information flow and enables the service providers to respond quickly to meet the needs of the clients. ICT includes information database and the internet, as strategy support. Databases piloted and installed in various FITS Centers include technology, manpower, infrastructure, publication, and other databases. The Internet may also be accessed by the clients for up-to-date information relevant to the agriculture and natural resources sectors.

Conclusion

Technology transfer leads to development in rural areas. Technology transfer is people-oriented. It affects specific individuals and society, in general. Whether linear or reciprocal, the framework of technology transfer includes exchange of symbols among individuals. Communication is central to implementing any technology transfer activity. For communication is "the lifeblood of society". It is the thread that binds society together. The information society that we're living in now proves the importance of communication to technology transfer.

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